C/O ratios for planet hosts: comparing two oxygen indicators

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Abstract

The variation of C/O ratios among solar-type stars may have important implications on the composition and structure of planets. Thus, the determination of this ratio in planet hosts is a first approximation of the bulk composition of a planet, assuming that the composition of the host stars and its proto-planetary disk is the same.
In this work we present C and O abundances for a sample of 110 and 648 stars with and without detected planets, respectively. We find that the mean [C/Fe] at different metallicity bins for planet hosts and non-hosts is very similar at [Fe/H] $>$ -0.3. However, for more metal poor bins, the planet hosts present higher [C/Fe], which are larger for the stars with less massive planets. These stars also show an overabundance of alpha elements pointing to the importance of other elements to form planets when the amount of Fe is low.
We derive C/O ratios using O abundances with the 6300A [OI] forbidden line and with the 6158A line. We find that C/O ratios slightly increase with metallicity and that there are not significant differences between planet hosts and non-hosts. The ratios provided by 6158A line are _˜0.05 dex lower than with the forbidden line but we still find some stars with C/O $>$ 0.8, impliying a possible formation of carbon-rich planets. Nevertheless, these ratios strongly depend on the errors of O abundances that are important because the O lines are very weak. For some stars the differences between C/O ratios from both indicators can be up to _˜0.5 dex (even for very high S/N spectra), therefore, we ask for a word of caution when using these ratios with an absolute meaning.
We also discuss the implications of using different set of models. We find differences of up to 0.16 dex on the C/O ratios depending on whether you use marcs or kurucz models.

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